

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

## Volume 5 | Technical Appendices

CFA25 | Castle Bromwich and Bromford

**Data appendix (AQ-001-025)**

Air quality

November 2013

# LONDON- WEST MIDLANDS ENVIRONMENTAL STATEMENT

Volume 5 | Technical Appendices

CFA25 | Castle Bromwich and Bromford

**Data appendix (AQ-001-025)**

Air quality

November 2013



Department  
for Transport

High Speed Two (HS2) Limited has been tasked by the Department for Transport (DfT) with managing the delivery of a new national high speed rail network. It is a non-departmental public body wholly owned by the DfT.

A report prepared for High Speed Two (HS2) Limited.

High Speed Two (HS2) Limited,  
Eland House,  
Bressenden Place,  
London SW1E 5DU

Details of how to obtain further copies are available from HS2 Ltd.

Telephone: 020 7944 4908

General email enquiries: [HS2enquiries@hs2.org.uk](mailto:HS2enquiries@hs2.org.uk)

Website: [www.hs2.org.uk](http://www.hs2.org.uk)

High Speed Two (HS2) Limited has actively considered the needs of blind and partially sighted people in accessing this document. The text will be made available in full on the HS2 website. The text may be freely downloaded and translated by individuals or organisations for conversion into other accessible formats. If you have other needs in this regard please contact High Speed Two (HS2) Limited.



Printed in Great Britain on paper  
containing at least 75% recycled fibre.

# Appendix AQ-001-025

|                       |                              |     |
|-----------------------|------------------------------|-----|
| Environmental topic:  | Air quality                  | AQ  |
| Appendix name:        | Data appendix                | 001 |
| Community forum area: | Castle Bromwich and Bromford | 025 |

# Contents

|          |   |           |
|----------|---|-----------|
| <b>1</b> | <b>Introduction</b>                           | <b>1</b>  |
| <b>2</b> | <b>Policy framework</b>                       | <b>2</b>  |
| <b>3</b> | <b>Baseline air quality data</b>              | <b>3</b>  |
| 3.1      | Existing air quality                          | 3         |
| 3.2      | Receptors                                     | 5         |
| <b>4</b> | <b>Dust impact evaluation and risk rating</b> | <b>7</b>  |
| <b>5</b> | <b>Air quality assessment - road traffic</b>  | <b>15</b> |
| 5.1      | Overall assessment approach                   | 15        |
| 5.2      | Model inputs and verification                 | 15        |
| 5.3      | Construction traffic model                    | 16        |
| 5.4      | Operational traffic model                     | 21        |
| <b>6</b> | <b>References</b>                             | <b>26</b> |

## List of figures

No table of figures entries found.

## List of tables

|  |    |
|--|----|
| Table 1: Annual mean pollutant concentrations recorded at continuous monitoring sites  | 3  |
| Table 2: Number of hours when hourly mean NO <sub>2</sub> concentrations exceed 200µg/m <sup>3</sup> at continuous monitoring sites' | 4  |
| Table 3: Number of days when daily mean PM <sub>10</sub> concentrations exceed 50µg/m <sup>3</sup> at continuous monitoring sites'   | 4  |
| Table 4: Annual mean NO <sub>2</sub> concentrations recorded at diffusion tube monitoring sites                                      | 4  |
| Table 5: Evaluation and risk rating of construction activities   | 7  |
| Table 6: Summary of construction dust impacts and effects  | 14 |
| Table 7: Comparison of monitored and modelled NO <sub>2</sub> concentrations   | 16 |
| Table 8: Modelled receptors (construction phase)   | 16 |

|   |    |
|---|----|
| Table 9: Background 2017 concentrations at assessed receptors                             | 17 |
| Table 10: Summary of DMRB annual mean NO <sub>2</sub> results (construction phase)        | 18 |
| Table 11: Summary of DMRB annual mean PM <sub>10</sub> results (construction phase)       | 18 |
| Table 12: Summary of ADMS-Roads annual mean NO <sub>2</sub> results (construction phase)  | 19 |
| Table 13: Summary of ADMS-Roads annual mean PM <sub>10</sub> results (construction phase) | 19 |
| Table 14: Modelled receptors (operational phase)  | 21 |
| Table 15: Background 2026 concentrations at assessed receptors                            | 22 |
| Table 16: Summary of DMRB annual mean NO <sub>2</sub> results (construction phase)        | 23 |
| Table 17: Summary of DMRB annual mean PM <sub>10</sub> results (construction phase)       | 23 |
| Table 18: Summary of ADMS-Roads annual mean NO <sub>2</sub> results (construction phase)  | 24 |
| Table 19: Summary of ADMS-Roads annual mean PM <sub>10</sub> results (construction phase) | 24 |

# 1 Introduction

- 1.1.1 The air quality appendices for the Castle Bromwich and Bromford community forum area (CFA25) comprise:
- discussion of the policy framework (Section 2);
  - baseline air quality data (Section 3);
  - dust impact evaluation and risk rating (Section 4); and
  - air quality assessment - road traffic (Section 5).
- 1.1.2 Maps referred to throughout the air quality appendix are contained in the Volume 5 air quality map book.

## 2 Policy framework

- 2.1.1 The Castle Bromwich and Bromford air quality study area is located within the administrative areas of Birmingham City Council and Solihull Metropolitan borough Council. At the local level, both local planning authorities within the study area have policies that seek to limit pollution levels, improve air quality and reduce emissions from development.
- 2.1.2 The Birmingham Unitary Development Plan (BUDP) (2005) includes policies 3.77 and 3.78 indicating the Birmingham City Council (BCC) is committed to improving air quality through modes of transport that reduce the impact of travel on air quality.<sup>1</sup>
- 2.1.3 The Birmingham Unitary Development Plan, currently under consultation (to replace the BUDP), will include policies specific to air quality. These state that consideration must be given to air quality for projects within Air Quality Management Areas (AQMAs), and where applicable mitigation must be sought to reduce the significant effects of development on any AQMA objectives.
- 2.1.4 The Solihull Unitary Development Plan (SUDP) (2006) sets policies to ensure that any new development contributes positively towards the council's environmental objectives. This includes considering the implications of new developments on air quality as part of ENV15.<sup>2</sup>
- 2.1.5 The Solihull Draft Local Plan (SDLP) (2012) will replace parts of the SUDP when adopted. The SDLP sets out plans for future development in the Borough.<sup>3</sup> Even though there is no policy specifically targeting air quality, the importance of improving air quality in the Borough is addressed in policies P12 regarding resource management, P14 regarding amenity and P9 with regards to climate change.

---

<sup>1</sup> Birmingham City Council (BCC) (2005). *Birmingham Unitary Development Plan*. BCC.

<sup>2</sup> Solihull Metropolitan Borough Council (SMBC) (2006). *Solihull Unitary Development Plan*. SMBC.

<sup>3</sup> Solihull Metropolitan Borough Council (SMBC) (2012). *Solihull Draft Local Plan - Shaping a Sustainable Future - Local Development Framework - Pre-Submission Draft*. SMBC.



## 3 Baseline air quality data

### 3.1 Existing air quality

#### Local authority review and assessment information

- 3.1.1 BCC has declared an AQMA for NO<sub>2</sub> and PM<sub>10</sub> that covers its entire administrative area. BCC has implemented an Air Quality Action Plan (AQAP) aimed at improving air quality.<sup>4</sup>
- 3.1.2 To date, SMBC have not declared an AQMA anywhere within their administrative area.

#### Local air quality monitoring data

- 3.1.3 Monitoring sites within the study area that are considered relevant for this assessment are shown in Map AQ-01-025 (Volume 5). The following sections provide a summary of the recorded pollutant concentrations at these sites.
- 3.1.4 The pollutant concentrations can be compared to the air quality standards:
- 40µg/m<sup>3</sup> as an annual mean for NO<sub>2</sub> and PM<sub>10</sub>;
  - 200µg/m<sup>3</sup> one-hour mean for NO<sub>2</sub> not to be exceeded more than 18 times a year (equivalent to the 99.8<sup>th</sup> percentile of the one-hour mean);
  - 50µg/m<sup>3</sup> 24-hour mean for PM<sub>10</sub> not to be exceeded more than 35 times a year (equivalent to the 90.4<sup>th</sup> percentile of the 24-hour mean); and
  - 25µg/m<sup>3</sup> as an annual mean for PM<sub>2.5</sub>.

#### Continuous monitoring

- 3.1.5 This section summarises the results from the continuous monitoring sites that are considered relevant for the assessment of air quality in this study area.

Table 1: Annual mean pollutant concentrations recorded at continuous monitoring sites<sup>5</sup>

| Pollutant  | Annual mean concentrations (µg/m <sup>3</sup> ) <sup>6</sup> |      |      |      |         |
|--|--|------|------|------|---------|
|  | 2008   | 2009 | 2010 | 2011 | 2012    |
| <b>BCC Birmingham Tyburn roadside (411577, 290491)</b>         |  |      |      |      |         |
| NO <sub>2</sub>  | No data*   | 47   | 51   | 45   | No data |
| PM <sub>10</sub>   | No data*   | 20   | 20   | 24   | No data |
| <b>BCC Birmingham Tyburn urban background (411592, 290440)</b> |  |      |      |      |         |
| NO <sub>2</sub>  | 31   | 32   | 37   | 34   | No data |
| PM <sub>10</sub>   | 18   | 20   | 25   | 23   | No Data |

\* No data was reported for this site in this year

<sup>4</sup> Birmingham City Council (BCC) (2011). *Air Quality Action Plan*. BCC.

<sup>5</sup> Birmingham City Council (BCC) (2013). *West Midlands Air Quality Group* [Online]. Available at: <http://www.wmair.org> [Accessed: August 2013]

<sup>6</sup> Where no data is listed, there is currently no publicly available data for that pollutant for that year.

Table 2: Number of hours when hourly mean NO<sub>2</sub> concentrations exceed 200µg/m<sup>3</sup> at continuous monitoring sites<sup>7,8</sup>

| Site                                   | Number of exceedances of hourly mean NO <sub>2</sub> standard <sup>9</sup> |      |      |      |         |
|--|--|------|------|------|---------|
|  | 2008   | 2009 | 2010 | 2011 | 2012    |
| BCC Birmingham Tyburn roadside         | No data  | 0    | 1    | 0    | No data |
| BCC Birmingham Tyburn urban background | 0  | 0    | 7    | 0    | No data |

Table 3: Number of days when daily mean PM<sub>10</sub> concentrations exceed 50µg/m<sup>3</sup> at continuous monitoring sites<sup>10,11</sup>

| Site                                   | Number of exceedances of daily mean PM <sub>10</sub> standard <sup>12</sup> |      |      |      |         |
|--|---|------|------|------|---------|
|  | 2008  | 2009 | 2010 | 2011 | 2012    |
| BCC Birmingham Tyburn roadside         | No data   | 0    | 0    | 0    | No data |
| BCC Birmingham Tyburn urban background | No data   | 0    | 0    | 0    | No data |

### Diffusion tubes

3.1.6 This section summarises the results from the diffusion tube sites that are considered relevant for the assessment of air quality in this study area.

Table 4: Annual mean NO<sub>2</sub> concentrations recorded at diffusion tube monitoring sites<sup>13</sup>

| Site                  | Ordnance Survey coordinates | Annual mean NO <sub>2</sub> concentrations (µg/m <sup>3</sup> ) |      |      |      |         |
|-----------------------|-----------------------------|---|------|------|------|---------|
|                       |                             | 2008  | 2009 | 2010 | 2011 | 2012    |
| BCC Birmingham Tyburn | 411592, 290438              | 31  | 35   | 42   | 33   | No data |

### Background pollutant concentrations

3.1.7 Estimates of background air quality have been taken from Defra maps.<sup>14</sup> Current background NO<sub>2</sub> concentrations are in excess of the air quality standard at some locations across the western section of the study area. Current background NO<sub>2</sub>

<sup>7</sup> 99.8<sup>th</sup> percentile of hourly mean NO<sub>2</sub> concentrations (µg/m<sup>3</sup>) not available

<sup>8</sup> Birmingham City Council (BCC) (2013). *West Midlands Air Quality Group* [Online]. Available at: <http://www.wmair.org> [Accessed: August 2013]

<sup>9</sup> Where no data is listed, there is currently no publicly available data available for that pollutant for that year.

<sup>10</sup> 90.4<sup>th</sup> percentile of daily mean PM<sub>10</sub> concentrations (µg/m<sup>3</sup>) not available

<sup>11</sup> Birmingham City Council (BCC) (2013). *West Midlands Air Quality Group* [Online]. Available at: <http://www.wmair.org> [Accessed: August 2013]

<sup>12</sup> Where no data is listed, there is currently no publicly available data for that pollutant for that year.

<sup>13</sup> Birmingham City Council (BCC) (2013). *West Midlands Air Quality Group* [Online]. Available at: <http://www.wmair.org> [Accessed: August 2013]

<sup>14</sup> Department for Environment, Food and Rural Affairs (Defra). *2010 Based Background Maps for NO<sub>x</sub>, NO<sub>2</sub> and PM<sub>10</sub>* [Online]. Available at: <http://laqm.defra.gov.uk/maps/maps2010.html>

concentrations range from between 40 µg/m<sup>3</sup> in the west of the study area and 20 µg/m<sup>3</sup> in the east of the study area. Background PM<sub>10</sub> concentrations are well below the air quality standard throughout the air quality study area, ranging from between 16 µg/m<sup>3</sup> and 25 µg/m<sup>3</sup> in 2012.

### Local emission sources

- 3.1.8 The main source of pollution within the study area is road vehicles. Major roads include the M6 motorway, the A38 Kingsbury Road/Tyburn Road, A4040 Bromford Lane, A47 Fort Parkway, the A452 and the A452 Cheater Road. Other emission sources include the permitted part A processes located within the industrial areas of study area, including that between the M6 motorway and the A38 Kingsbury Road/Tyburn Road in Bromford. Contributions to local pollutant concentrations made by these industrial installations are included within the background concentrations used in this assessment.

## 3.2 Receptors

### Human

#### *Construction phase*

- 3.2.1 There are a number of human receptors in the study area that are close to construction areas. The receptors closest to dust-generating activities and/or traffic routes used during the construction of the Proposed Scheme have been included in this assessment.
- 3.2.2 For the construction dust assessment, these include properties located on B4118 Birmingham Road, Lanchester Way, Parkfield Drive, Spitfire Way, Blenheim Way, Javelin Avenue, Kingsleigh Drive and Cadbury Drive. The position of the representative receptors of greatest risk of dust effects are indicated on Map AQ-02-25-01 (Volume 5).
- 3.2.3 For the construction traffic assessment, the representative receptors considered are located on Tyburn Road, Bromford Drive and Chillinghome Road in Bromford, Avery Croft, Bader Walk and Concorde Drive in Castle Vale, and Kingsleigh Drive, Crawshaws Road, Chadhunt Close and Lanchester Way in Castle Bromwich (Map AQ-01-025).

#### *Operational phase*

- 3.2.4 Similar to the construction phase, human receptors during the operation of the Proposed Scheme have been selected due to their proximity to affected roads. The representative receptors considered are located on Tyburn Road, Bromford Drive and Chillinghome Road in Bromford, and Kingsleigh Drive, Crawshaws Road, Chadhunt Close and Lanchester Way in Castle Bromwich.

### Ecological

#### *Construction phase*

- 3.2.5 Park Hall nature reserve is a locally designated ecological site within the Castle Bromwich and Bromford area. It has been considered in the construction dust

assessment. There are no nationally or European designated ecological receptors within the Castle Bromwich and Bromford area.

*Operational phase*

- 3.2.6 There are no nationally or European designated ecological receptors within the Castle Bromwich and Bromford area.

## 4 Dust impact evaluation and risk rating

4.1.1 The following sections provide details of the assessment of construction impacts following the Institute of Air Quality Management (IAQM) guidance.<sup>15</sup> Where considered useful to identify receptors and their relationship to the construction activity, a specific figure is provided.

Table 5: Evaluation and risk rating of construction activities

| Activity  | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications  |
|---|------------------------------|---------------------|--------------------|---------------------------------|---------------------|---|
| <b>Properties around Plank Lane / B4118 Birmingham Road (Volume 5, Map AQ-01-025)</b> |                              |                     |                    |                                 |                     |   |
| Demolition  | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No demolition works within 350m of properties   |
| Earthworks  | 180 m                        | Large               | Medium             | Low                             | Negligible          | No properties with 100m of the earthworks<br>Total site area >10,000m <sup>2</sup><br>No dwellings within 20m |
| Construction  | 240 m                        | Small               | Negligible         | Low                             | Negligible          | No properties with 100m of the earthworks<br>No on-site concrete batching                                     |
| Trackout  | <20 m                        | Large               | High               | Low                             | Negligible          | Properties within 20m<br>Assumption of >100 Heavy Duty Vehicles (HDV) trips per day                           |

<sup>15</sup> Institute of Air Quality Management (IAQM) (2011). *Guidance on the assessment of the impacts of construction on air quality and the determination of their significance*. IAQM.

| Activity   | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications   |
|--|------------------------------|---------------------|--------------------|---------------------------------|---------------------|--|
| <b>Park Hall nature reserve (Volume 5: Map AQ-01-025)</b>        |                              |                     |                    |                                 |                     |  |
| Demolition   | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No demolition works within 100 m of Park Hall nature reserve   |
| Earthworks   | <20m                         | Large               | Medium             | Medium                          | Negligible          | Earthworks within the Reserve<br><br>Assumption of >100,000 tonnes of material to be removed<br><br>Locally designated site            |
| Construction   | <20m                         | Large               | Medium             | Medium                          | Negligible          | Construction works within the Reserve<br><br>Assumption of total building volume >100,000m <sup>3</sup><br><br>Locally designated site |
| Trackout   | <20m                         | Large               | Medium             | Medium                          | Negligible          | Road used by construction traffic within the Reserve<br><br>Assumption of >100 HDV trips per day<br><br>Locally designated site        |
| <b>Properties along Lanchester Way (Volume 5: Map AQ-01-025)</b> |                              |                     |                    |                                 |                     |  |
| Demolition   | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No demolition works within 350m of properties  |
| Earthworks   | 160m                         | Large               | Medium             | Low                             | Negligible          | No properties within 100m of the earthworks  |

| Activity   | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications   |
|--|------------------------------|---------------------|--------------------|---------------------------------|---------------------|--|
| Construction   | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 350m of construction works  |
| Trackout   | 80m                          | Medium              | Low                | Low                             | Negligible          | Properties within 50-100m of a construction route<br><br>Assumption of 25-100 HDV trips per day  |
| <b>Park Hall Academy, properties along B4118 Birmingham Road (Volume 5: Map AQ-01-025)</b> |                              |                     |                    |                                 |                     |  |
| Demolition   | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 350m of demolition works  |
| Earthworks   | 160m                         | Large               | Medium             | Low                             | Negligible          | No properties within 100m of the earthworks<br><br>Area >10,000m <sup>2</sup> involved in earthworks   |
| Construction   | 190m                         | Medium              | Low                | Low                             | Negligible          | No properties within 100m of the construction works<br><br>Assumption total building volume 25,000 - 100,000m <sup>3</sup><br><br>Assumed that there will be no on-site concrete batching<br><br>No dwellings with 20m |
| Trackout   | 80 m                         | Large               | Medium             | Low                             | Negligible          | Properties with 20m  |

| Activity  | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications   |
|---|------------------------------|---------------------|--------------------|---------------------------------|---------------------|--|
|   |                              |                     |                    |                                 |                     | Assumption of >100 HDV trips per day   |
| <b>Properties around Parkfield Drive (Volume 5: Map AQ-01-025)</b>  |                              |                     |                    |                                 |                     |  |
| Demolition  | 260m                         | Small               | Negligible         | Low                             | Negligible          | No properties within 200m of demolition works<br><br>Assumption total building volume <20,000m <sup>3</sup>          |
| Earthworks  | 240m                         | Large               | Low                | Low                             | Negligible          | No properties within 200m of earthworks<br><br>Total site area >10,000 m <sup>2</sup>                                |
| Construction  | 250m                         | Large               | Low                | Low                             | Negligible          | No properties within 200m of the construction works<br><br>Total building volume >100,000m <sup>3</sup>              |
| Trackout  | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 100m of construction vehicle routes   |
| <b>Benwood Court Care Home, properties along Spitfire Way and Blenheim Way (Volume 5: Map AQ-02-025-01 Figure 25.3)</b> |                              |                     |                    |                                 |                     |  |
| Demolition  | 70m                          | Small               | Low                | Medium                          | Negligible          | No properties within 20m of demolition works<br><br>Total building volume <20,000m <sup>3</sup><br><br>Suburban area |
| Earthworks  | 80m                          | Large               | Medium             | Medium                          | Negligible          | No properties within 50m   |



| Activity  | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications  |
|---|------------------------------|---------------------|--------------------|---------------------------------|---------------------|---|
|   |                              |                     |                    |                                 |                     | of earthworks<br>Total site area >10,000m <sup>2</sup><br>Suburban area   |
| Construction  | 80m                          | Large               | Medium             | Medium                          | Negligible          | No properties within 50m of construction works<br>Total building volume >100,000m <sup>3</sup><br>Suburban area       |
| Trackout  | <20m                         | Large               | High               | High                            | Slight Adverse      | Properties within 20m<br>Assumption of >100 HDV trips per day<br>10-100 dwellings within 20m                          |
| <b>Properties along Javelin Avenue and Farnborough Road (Volume 5: Map AQ-02-025-01, Figure 25.4)</b> |                              |                     |                    |                                 |                     |   |
| Demolition  | 200m                         | Small               | Negligible         | Medium                          | Negligible          | No properties within 200m of demolition works   |
| Earthworks  | 140m                         | Large               | Medium             | Medium                          | Negligible          | No properties within 100m of earthworks<br>Total site area >10,000m <sup>2</sup>                                      |
| Construction  | 140m                         | Medium              | Low                | Medium                          | Negligible          | No properties within 100m of construction works<br>Total building volume 25,000m <sup>3</sup> - 100,000m <sup>3</sup> |

| Activity  | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications   |
|---|------------------------------|---------------------|--------------------|---------------------------------|---------------------|--|
|   |                              |                     |                    |                                 |                     | Suburban area  |
| Trackout  | <20m                         | Large               | High               | High                            | Slight adverse      | Properties within 20m of construction route<br><br>Assumption of >100 HDV trips per day<br><br>10-100 dwellings within 20m |
| <b>Properties along Kingsleigh Drive (Volume 5: Map AQ-02-025-01 Figure 25.1)</b> |                              |                     |                    |                                 |                     |  |
| Demolition  | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 350m of demolition works  |
| Earthworks  | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 350m of earthworks  |
| Construction  | n/a                          | n/a                 | n/a                | n/a                             | n/a                 | No properties within 350m of construction works  |
| Trackout  | 100m                         | Large               | Medium             | Medium                          | Negligible          | Properties within 20-50m of construction route<br><br>Assumption of >100 HDV trips per day<br><br>No dwellings within 20m  |
| <b>Properties along Cadbury Drive (Volume 5: Map AQ-02-05-01 Figure 25.2)</b>     |                              |                     |                    |                                 |                     |  |
| Demolition  | 100m                         | Small               | Low                | Medium                          | Negligible          | No properties within 100m of demolition works<br><br>Total building volume >10,000m <sup>3</sup>                           |

| Activity     | Distance to nearest receptor | Dust emission class | Dust risk category | Sensitivity of surrounding area | Magnitude of impact | Principal justifications   |
|--------------|------------------------------|---------------------|--------------------|---------------------------------|---------------------|--|
|              |                              |                     |                    |                                 |                     | Suburban area  |
| Earthworks   | 30m                          | Medium              | Medium             | Medium                          | Negligible          | No properties within 50m of nearest earthworks<br><br>Total site area 2,500 - 10,000m <sup>2</sup><br><br>Suburban area  |
| Construction | 130m                         | Large               | Medium             | Medium                          | Negligible          | No properties within 100m of construction works<br><br>Total building volume >100,000m <sup>3</sup><br><br>Suburban area |
| Trackout     | <20m                         | Large               | High               | High                            | Slight Adverse      | Properties within 20m<br><br>Assumption of >100 HDV trips per day<br><br>10-100 dwellings within 20m                     |

Table 6: Summary of construction dust impacts and effects

| Location   | Magnitude of impact | Effect of dust-generating activities | Additional mitigation |
|--|---------------------|--------------------------------------|-----------------------|
| Properties around Plank Lane / B4118 Birmingham Road (Volume 5: Map AQ-01-025)                                   | Negligible          | Not significant                      | None required         |
| Park Hall nature reserve (Volume 5: Map AQ-01-025)   | Negligible          | Not significant                      | None required         |
| Properties along Lanchester Way (Volume 5: Map AQ-01-025)  | Negligible          | Not significant                      | None required         |
| Park Hall Academy, properties along B4118 Birmingham Road (Volume 5: Map AQ-01-025)                              | Negligible          | Not significant                      | None required         |
| Properties around Packfield Drive (Volume 5: Map AQ-01-025)  | Negligible          | Not significant                      | None required         |
| Benwood Court Care Home, properties along Spitfire Way and Blenheim Way (Volume 5: Map AQ-02-025-01 Figure 25.3) | Slight adverse      | Not significant                      | None required         |
| Properties along Javelin Avenue and Farnborough Road (Volume 5: Map AQ-02-025-01, Figure 25.4)                   | Slight adverse      | Not significant                      | None required         |
| Properties along Kingsleigh Drive (Volume 5: Map AQ-02-025-01, Figure 25.1)                                      | Negligible          | Not significant                      | None required         |
| Properties along Cadbury Drive (Volume 5: Map AQ-02-025-01, Figure 25.2)   | Slight adverse      | Not significant                      | None required         |

## 5 Air quality assessment - road traffic

### 5.1 Overall assessment approach

- 5.1.1 The air quality assessment for road related emissions has used three different approaches based on the scale of changes in traffic and road alignment. Where the Design Manual for Roads and Bridges (DMRB) thresholds detailed in the SMR (Volume 5: Appendix CT-001-000/1) will not be exceeded, any additional assessment is not required as the air quality impacts will be minimal.<sup>16</sup> If these thresholds are breached, then a quantitative assessment has been carried out.
- 5.1.2 If it is considered unlikely that air quality standards will be exceeded and the road configuration is a simple one, then the DMRB screening method has been used to predict changes in air quality. Where there will be a risk of standards being exceeded, where the road layout is considered to be complex or where the use of the DMRB screening method has indicated that there will be a potential exceedance of air quality standards, then the atmospheric dispersion model ADMS-Roads has been used for the assessment. Professional judgment has been used to select the appropriate tool for each area.
- 5.1.3 In this study area both the DMRB screening method and the ADMS-Roads model have been used for the assessment.

### 5.2 Model inputs and verification

#### Model parameters for detailed assessment

- 5.2.1 ADMS-Roads was used for the detailed assessment. A surface roughness length of 1.5m, meteorological site surface roughness length of 0.2m, minimum Monin Obukhov length of 100m and latitude of 52.5 degrees were used in the detailed assessment. All other parameters were model default settings. Meteorological data for the year 2012 from the Birmingham Elmdon monitoring site was used.

#### Model verification

- 5.2.2 Verification has been undertaken using additional data gathered for the assessment using NO<sub>2</sub> diffusion tubes at three locations within the Castle Bromwich and Bromford area. The diffusion tubes were located on Tyburn Road (grid ref: 410017, 289999 (Volume 5: Map AQ-01-025, D5), Bromford Drive (grid ref: 412246, 289797 (Volume 5: Map AQ-01-025-E6) and Papyrus Way (grid ref: 413557, 290088 (Volume 5: Map AQ-001-025, E6).
- 5.2.3 Verification was undertaken for the base year of 2012 for NO<sub>2</sub> comparing monitored and modelled concentrations. The results of this comparison are shown in Table 7.

<sup>16</sup> Highways Agency (HA) (2007). *The Design Manual for Roads and Bridges (Volume 11, Section 3, Part 1 Air Quality HA207/07 . HA.*

Table 7: Comparison of monitored and modelled NO<sub>2</sub> concentrations

| Site                                 | Monitored concentration (µg/m <sup>3</sup> ) | Modelled concentration (µg/m <sup>3</sup> ) | Difference [(modelled - monitored)/monitored] * 100 |
|--------------------------------------|--|---|---|
| HS2 Diffusion Tube on Tyburn Road    | 49   | 49  | 0%  |
| HS2 Diffusion Tube on Bromford Drive | 50   | 43  | -14%  |
| HS2 Diffusion Tube on Papyrus Way    | 48   | 43  | -10%  |

- 5.2.4 As all modelled NO<sub>2</sub> concentrations were within  $\pm 25\%$  of the monitored concentrations, no model adjustment was undertaken.

## 5.3 Construction traffic model

- 5.3.1 Construction traffic data used in this assessment are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were without the Proposed Scheme and with the Proposed Scheme (months 30, 35 and 44 of the construction period). The maximum change in months 30, 35 and 44 has been assessed for each of the receptors.

### Receptors assessed

- 5.3.2 Sensitive receptors within 200m of road links which meet the DMRB criteria have been included in the assessment. These are representative of worst-case exposure locations. The assessed receptors are listed in Table 8: Modelled receptors (construction phase) and shown on Map AQ-01-025 (Volume 5).

Table 8: Modelled receptors (construction phase)

| Receptor | Description/Location | Ordnance Survey coordinates | Scenarios assessed with the Proposed Scheme |
|----------|----------------------|-----------------------------|---|
| 25-1     | 146 Tyburn Road      | 410039, 290007              | Month 35                                    |
| 25-2     | 486 Tyburn Road      | 411305, 290299              | Month 35                                    |
| 25-3     | 546 Tyburn Road      | 411402, 290449              | Month 30                                    |
| 25-4     | 545 Tyburn Road      | 411506, 290455              | Month 30                                    |
| 25-5     | 111 Bromford Drive   | 412281, 289789              | Month 35                                    |
| 25-6     | 94 Chillinghome Road | 412827, 289949              | Month 44                                    |
| 25-7     | 9 Bader Walk         | 413817, 290779              | Month 44                                    |
| 25-8     | 19 Concorde Drive    | 413912, 290742              | Month 44                                    |
| 25-9     | 39 Avery Croft       | 413888, 290663              | Month 44                                    |
| 25-10    | 76 Kingsleigh Drive  | 414491, 290067              | Month 44                                    |
| 25-11    | 31 Crawshaws Road    | 415193, 290307              | Month 44                                    |

| Receptor | Description/Location | Ordnance Survey coordinates | Scenarios assessed with the Proposed Scheme |
|----------|----------------------|-----------------------------|---|
| 25-12    | 77 Chadshunt Close   | 415956, 290616              | Month 44                                    |
| 25-13    | 274 Lanchester Way   | 416926, 290393              | Month 44                                    |

- 5.3.3 For receptors located within the Bromford and Castle Vale areas of the study area (25-1 - 25-9), where roads such as the A38 Kingsbury Road/Tyburn Road, A452 Chester Road and A4040 Bromford Lane are often busy, detailed modelling has been undertaken. For receptors located in the Castle Bromwich area of the study area (25-10 - 25-13), where the roads considered are not as busy, the DMRB screening method has been undertaken.

### Background concentrations

- 5.3.4 The background concentrations used in the assessment are shown in Table 9: Background 2017 concentrations at assessed receptors taken from the Defra maps.

Table 9: Background 2017 concentrations at assessed receptors

| Receptor (or zone of receptors) | Concentrations ( $\mu\text{g}/\text{m}^3$ ) |                 |                  |
|---------------------------------|---|-----------------|------------------|
|                                 | NO <sub>x</sub>                             | NO <sub>2</sub> | PM <sub>10</sub> |
| 25-1                            | 38.5  | 24.3            | 17.9             |
| 25-2                            | 41.3  | 25.6            | 18.8             |
| 25-3                            | 41.3  | 25.6            | 18.8             |
| 25-4                            | 41.3  | 25.6            | 18.8             |
| 25-5                            | 39.5  | 25.0            | 19.3             |
| 25-6                            | 39.5  | 25.0            | 19.3             |
| 25-7                            | 43.4  | 26.5            | 20.1             |
| 25-8                            | 43.4  | 26.5            | 20.1             |
| 25-9                            | 43.4  | 26.5            | 20.1             |
| 25-10                           | 34.4  | 22.2            | 19.2             |
| 25-11                           | 29.8  | 19.8            | 18.1             |
| 25-12                           | 29.8  | 19.8            | 18.1             |
| 25-13                           | 24.8  | 17.2            | 17.6             |

## DMRB model results

5.3.5 This section provides the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptor are also derived following the Environmental Protection UK (EPUK) methodology.<sup>17</sup>

Table 10: Summary of DMRB annual mean NO<sub>2</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                              |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change <sup>18</sup> | Impact descriptor |
|----------|-------------------------------------|------------------------------|---------------------------|---|-----------------------------------|-------------------|
|          | 2012 baseline                       | 2017 without Proposed Scheme | 2017 with Proposed Scheme |   |                                   |                   |
| 25-10    | 36.9                                | 31.4                         | 31.5                      | 0.1   | Imperceptible                     | Negligible        |
| 25-11    | 26.8                                | 22.7                         | 22.7                      | <0.1  | Imperceptible                     | Negligible        |
| 25-12    | 28.4                                | 23.9                         | 24.0                      | 0.1   | Imperceptible                     | Negligible        |
| 25-13    | 26.4                                | 22.5                         | 22.6                      | 0.1   | Imperceptible                     | Negligible        |

Table 11: Summary of DMRB annual mean PM<sub>10</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                              |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2012 baseline                       | 2017 without Proposed Scheme | 2017 with Proposed Scheme |   |                     |                   |
| 25-10    | 22.1                                | 20.6                         | 20.6                      | <0.1  | Imperceptible       | Negligible        |
| 25-11    | 19.5                                | 18.4                         | 18.4                      | <0.1  | Imperceptible       | Negligible        |
| 25-12    | 19.7                                | 18.6                         | 18.6                      | <0.1  | Imperceptible       | Negligible        |
| 25-13    | 19.3                                | 18.3                         | 18.3                      | <0.1  | Imperceptible       | Negligible        |

<sup>17</sup> Environmental Protection UK (EPUK), (2010), *Development Control: Planning for Air Quality*



## Detailed modelling results

5.3.6 This section provides the summary of the modelled pollutant concentrations for the assessed receptors. The magnitude of change and impact descriptor are also derived following the Environmental Protection UK (EPUK) methodology.<sup>17</sup>

Table 12: Summary of ADMS-Roads annual mean NO<sub>2</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                              |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2012 baseline                       | 2017 without Proposed Scheme | 2017 with Proposed Scheme |   |                     |                   |
| 25-1     | 45.8                                | 36.8                         | 36.9                      | 0.1   | Imperceptible       | Negligible        |
| 25-2     | 42.5                                | 36.2                         | 36.4                      | 0.2   | Imperceptible       | Negligible        |
| 25-3     | 41.8                                | 35.2                         | 35.2                      | <0.1  | Imperceptible       | Negligible        |
| 25-4     | 39.6                                | 33.4                         | 33.4                      | <0.1  | Imperceptible       | Negligible        |
| 25-5     | 40.1                                | 31.3                         | 31.3                      | <0.1  | Imperceptible       | Negligible        |
| 25-6     | 40.3                                | 31.2                         | 31.2                      | <0.1  | Imperceptible       | Negligible        |
| 25-7     | 48.7                                | 40.8                         | 41.1                      | 0.3   | Imperceptible       | Negligible        |
| 25-8     | 41.4                                | 34.1                         | 34.3                      | 0.2   | Imperceptible       | Negligible        |
| 25-9     | 44.7                                | 37.0                         | 37.1                      | 0.1   | Imperceptible       | Negligible        |

Table 13: Summary of ADMS-Roads annual mean PM<sub>10</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                              |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2012 baseline                       | 2017 without Proposed Scheme | 2017 with Proposed Scheme |   |                     |                   |
| 25-1     | 21.7                                | 20.9                         | 20.9                      | <0.1  | Imperceptible       | Negligible        |
| 25-2     | 21.5                                | 20.8                         | 20.8                      | <0.1  | Imperceptible       | Negligible        |

| Receptor | Concentrations ( $\mu\text{g}/\text{m}^3$ ) |                              |                           | Change in concentrations ( $\mu\text{g}/\text{m}^3$ ) | Magnitude of change | Impact descriptor |
|----------|---|------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2012 baseline                               | 2017 without Proposed Scheme | 2017 with Proposed Scheme |   |                     |                   |
| 25-3     | 21.4  | 20.5                         | 20.5                      | <0.1  | Imperceptible       | Negligible        |
| 25-4     | 21.1  | 20.3                         | 20.3                      | <0.1  | Imperceptible       | Negligible        |
| 25-5     | 22.0  | 20.8                         | 20.8                      | <0.1  | Imperceptible       | Negligible        |
| 25-6     | 22.0  | 20.8                         | 20.8                      | <0.1  | Imperceptible       | Negligible        |
| 25-7     | 23.8  | 22.6                         | 22.6                      | <0.1  | Imperceptible       | Negligible        |
| 25-8     | 22.8  | 21.5                         | 21.5                      | <0.1  | Imperceptible       | Negligible        |
| 25-9     | 23.2  | 21.9                         | 21.9                      | <0.1  | Imperceptible       | Negligible        |

## Assessment of significance

- 5.3.7 The impact at all receptors for changes to annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations is predicted to be negligible. No changes to daily mean PM<sub>10</sub> concentrations are predicted as a result of the construction of the Proposed Scheme.
- 5.3.8 Air quality effects arising from changes to traffic associated with the construction of the Proposed Development are anticipated to be insignificant, as pollutant concentrations are well below the relevant air quality standards and the impact descriptor at all receptors is negligible.

## 5.4 Operational traffic model

- 5.4.1 Operational traffic data used in this assessment are detailed in Volume 5: Appendix TR-001-000. Scenarios assessed were without the Proposed Scheme and with the Proposed Scheme in 2026.

### Receptors assessed

- 5.4.2 Sensitive receptors within 200m of road links that meet the DMRB criteria have been included in this assessment. These are representative of worst-case exposure locations. The assessed receptors are listed in Table 14: Modelled receptors (operational phase) and Map AQ-01-025 (Volume 5).

Table 14: Modelled receptors (operational phase)

| Receptor | Description/Location | Ordnance Survey coordinates |
|----------|----------------------|-----------------------------|
| 25-2     | 486 Tyburn Road      | 411305, 290299              |
| 25-3     | 546 Tyburn Road      | 411402, 290449              |
| 25-4     | 545 Tyburn Road      | 411506, 290455              |
| 25-5     | 111 Bromford Drive   | 412281, 289789              |
| 25-6     | 94 Chillinghome Road | 412827, 289949              |
| 25-10    | 76 Kingsleigh Drive  | 414491, 290067              |
| 25-11    | 31 Crawshaws Road    | 415193, 290307              |
| 25-12    | 77 Chadshunt Close   | 415956, 290616              |
| 25-13    | 274 Lanchester Way   | 416926, 290393              |

- 5.4.3 For receptors located within the Bromford and Castle Vale areas of the study area (25-2 - 25-6), where roads such as the A38 Kingsbury Road/Tyburn Road, A452 Chester Road and A4040 Bromford Lane are often busy, detailed modelling has been undertaken. For receptors located in the Castle Bromwich area of the study area (25-10 - 25-13), where the roads considered are not as busy, the DMRB screening method has been undertaken.

## Background concentrations

- 5.4.4 The background concentrations used in the assessment are shown in Table 15:  
Background 2026 concentrations at assessed receptors taken from the Defra maps.

Table 15: Background 2026 concentrations at assessed receptors

| Receptor (or zone of receptors) | Concentrations ( $\mu\text{g}/\text{m}^3$ ) |                 |                  |
|---------------------------------|---|-----------------|------------------|
|                                 | NO <sub>x</sub>                             | NO <sub>2</sub> | PM <sub>10</sub> |
| 25-2                            | 34.2  | 22.0            | 18.1             |
| 25-3                            | 34.2  | 22.0            | 18.1             |
| 25-4                            | 34.2  | 22.0            | 18.1             |
| 25-5                            | 32.1  | 21.1            | 18.8             |
| 25-6                            | 32.1  | 21.1            | 18.8             |
| 25-10                           | 28.0  | 18.7            | 12.2             |
| 25-11                           | 24.0  | 16.5            | 17.5             |
| 25-12                           | 24.0  | 16.5            | 17.5             |
| 25-13                           | 20.1  | 14.3            | 17.1             |

## DMRB model results

5.4.5 This section provides the summary of the modelled pollutant concentrations for the assessed receptors in the operational phase. The magnitude of change and impact descriptor are also derived following the Environmental Protection UK (EPUK) methodology.<sup>17</sup>

Table 16: Summary of DMRB annual mean NO<sub>2</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2026 without Proposed Scheme        | 2026 with Proposed Scheme |   |                     |                   |
| 25-10    | 27.4                                | 27.4                      | <0.1  | Imperceptible       | Negligible        |
| 25-11    | 19.3                                | 19.3                      | <0.1  | Imperceptible       | Negligible        |
| 25-12    | 20.6                                | 20.6                      | <0.1  | Imperceptible       | Negligible        |
| 25-13    | 19.3                                | 19.3                      | <0.1  | Imperceptible       | Negligible        |

Table 17: Summary of DMRB annual mean PM<sub>10</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2026 without Proposed Scheme        | 2026 with Proposed Scheme |   |                     |                   |
| 25-2     | 20.1                                | 20.1                      | <0.1  | Imperceptible       | Negligible        |
| 25-3     | 17.9                                | 17.9                      | <0.1  | Imperceptible       | Negligible        |
| 25-4     | 18.1                                | 18.1                      | <0.1  | Imperceptible       | Negligible        |
| 25-5     | 17.8                                | 17.8                      | <0.1  | Imperceptible       | Negligible        |

## Detailed modelling results

5.4.6 This section provides the summary of the modelled pollutant concentrations for the assessed receptors in the operational phase. The magnitude of change and impact descriptor are also derived following the Environmental Protection UK (EPUK) methodology.<sup>17</sup>

Table 18: Summary of ADMS-Roads annual mean NO<sub>2</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2026 without Proposed Scheme        | 2026 with Proposed Scheme |   |                     |                   |
| 25-2     | 25.8                                | 25.8                      | <0.1  | Imperceptible       | Negligible        |
| 25-3     | 25.7                                | 25.7                      | <0.1  | Imperceptible       | Negligible        |
| 25-4     | 24.9                                | 24.9                      | <0.1  | Imperceptible       | Negligible        |
| 25-5     | 23.6                                | 23.6                      | <0.1  | Imperceptible       | Negligible        |
| 25-6     | 23.4                                | 23.4                      | <0.1  | Imperceptible       | Negligible        |

Table 19: Summary of ADMS-Roads annual mean PM<sub>10</sub> results (construction phase)

| Receptor | Concentrations (µg/m <sup>3</sup> ) |                           | Change in concentrations (µg/m <sup>3</sup> ) | Magnitude of change | Impact descriptor |
|----------|-------------------------------------|---------------------------|---|---------------------|-------------------|
|          | 2026 without Proposed Scheme        | 2026 with Proposed Scheme |   |                     |                   |
| 25-2     | 19.9                                | 19.8                      | -0.1  | Imperceptible       | Negligible        |
| 25-3     | 19.7                                | 19.7                      | <0.1  | Imperceptible       | Negligible        |
| 25-4     | 19.5                                | 19.5                      | <0.1  | Imperceptible       | Negligible        |
| 25-5     | 20.2                                | 20.2                      | <0.1  | Imperceptible       | Negligible        |
| 25-6     | 20.2                                | 20.3                      | +0.1  | Imperceptible       | Negligible        |

### **Assessment of significance**

- 5.4.7 The impact descriptor at all receptors for changes to annual mean NO<sub>2</sub> and PM<sub>10</sub> concentrations is predicted to be negligible. No changes to daily mean PM<sub>10</sub> concentrations are predicted as a result of the operation of the Proposed Scheme.
- 5.4.8 Air quality effects arising from changes to traffic associated with the operation of the Proposed Scheme are anticipated to be insignificant. 2026 pollutant concentrations are predicted to be well below the relevant air quality standards and the impact descriptor at all assessed receptors is negligible.

## 6 References

Birmingham City Council (BCC) (2005). *Birmingham Unitary Development Plan*. BCC.

Birmingham City Council (BCC) (2011). *Air Quality Action Plan*. BCC.

Birmingham City Council (BCC) (2013). West Midlands Air Quality Group [Online]. Available at: <http://www.wmair.org>; Accessed: August 2013.

Environmental Protection UK (EPUK) (2010). *Development Control - Planning for Air Quality*.

Highways Agency (HA) (2007). *The design Manual for Roads and Bridges (Volume 11, Section 3, Part 1 - Air Quality HA207/07)*.

Institute of Air Quality Management (IAQM) (2011). *Guidance on the assessment of the Impacts of Construction on Air Quality and the Determination of their significance*. IAQM.

Solihull Metropolitan Borough Council (SMBC) (2006). *Solihull Unitary Development Plan*. SMBC.

Solihull Metropolitan Borough Council (SMBC) (2012). *Solihull Draft Local Plan - Shaping a Sustainable Future - Local Development Framework - Pre-submission Draft*. SMBC.